

most preferably 1 to 2% by weight more particularly it is up to about 1.6% by weight of the product. For example in biscuits intended to supplement a diet with calcium one can employ approximately 20 grams per so-called biscuit representing about 2% of the final product.

The addition of the calcareous product used in the invention as compared to the results when other sources of calcium are used not only improved the properties of baked produces but, in some instances, has also been found to provide a buffering effect in the stomach and also appears to provide anticariogenic effects. It is believed that this may partly arise from protection against acid in the mouth.

The invention will now be illustrated by the following examples which are not however intended to limit the scope of the invention. The Calcium Product (calcareous product derived from corallinaceae) employed is a commercial product prepared from Lithothamnium corallioides residues as described above and having the analysis set out above and identified commercially as AquaMin (trademark). The coated Calcium Product is the calcareous product coated with a mono-diglyceride.

EXAMPLE 1

Fortification of pasta with calcium

A conventional pasta product of the spaghetti nature manufactured from durum or other hard wheat flour was employed.

Manufacture of Pasta:

A basic recipe for pasta was used.

Durham Wheat Semolina (766g) + Tap Water (234g) → 1Kg of Pasta.

Mix for 10 min in mixing chamber of the pasta press

↓

Rest for 5 min

↓

Warm up die : Extrude

↓

Cook for four min

↓

Cool for 30-60 sec under running tap water

↓

the appearance and taste of the biscuits fortified with Calcareous Product and coated Calcareous Product when compared with the control. Most people were unable to identify which biscuits had the additional Calcium. However the biscuits fortified with Calcium Carbonate were pale in colour, soft and unpalatable o taste (loss of sweet flavour).

EXAMPLE 3

CALCIUM FORTIFICATION OF SPREADS

Margarine

Vegetable Oil Spread

Fat Content

80% minimum

70-20%

Nature of Fats

Saturated

Unsaturated



High Melting Point Low Melting Point

Emulsion

There are two phases:

Water Phase

Oil Phase

The two phases are mixed to build the emulsion. Emulsion building requires energy input in the form of mechanical agitation, ultrasonic vibration or heat.

1. Emulsion Building (3 to 5 minutes)
2. Quick Chilling To 15°C
3. Fat Crystallization

Method

AquaMin (calcareous product) must be added to the oil phase : the oil will go inside the pores. This will help stabilize the emulsion.

The order of mixing is critical for the addition of AquaMin to this type of emulsion structure spread.

If AquaMin is added to the water phase first, then the water enters the porous structure and these pores become polar. The outside surface of AquaMin is also polar, so that when this is now mixed with the oil, which is hydrophobic, this will destabilize the emulsion.

If however, AquaMin is added to the oil phase first, then the oil enters the

Sample:

Taste (1 = very poor, 5 = very good)

Grittiness (1 = very gritty, 5 = not gritty)

Overall acceptability (1 = worst, 5 = best)

19 panelists took part in this analysis and the results were as follows

Sample	Taste	Grittiness	Acceptability	Preference
A. AquaMin	3.2	4.6	3.6	15
B. Calcium Carbonate	2.8	4.3	2.9	1
C. Control	2.7	2.9	2.3	3

From the results it is clear that AquaMin fortified ice-cream is predominant 79% of panelists preferred the ice-cream fortified with AquaMin. The control and the ice-cream fortified with calcium carbonate lagged behind, with only 16% and 5% of preferences respectively. The ice-cream fortified with AquaM scored highest on all parameters of taste, grittiness and acceptability (organoleptic properties).

3. Colour was measured using a Minolta colour meter and the results were expressed using LAB values:

L = Lightness

A = Red Colour

B = Yellow Colour

Sample	L value	A value	B value
Control	94.03	-3.21	11.82
AquaMin fortified ice-cream	94.39	-2.87	11.37
Calcium carbonate fortified ice-cream	95.61	-2.84	10.83

A statistical Student's t- Test was carried out on these values (9 values for each sample) and the results of the test showed that there was a significant difference between the control and the ice-cream fortified with calcium carbonate for each of the three parameters. AquaMin only had a significant effect on the A value of the ice-cream,

it did not effect the L or B values.

4. A further batch of ice-ream was made to assess if calcium addition effected the over-run properties of the ice-cream. Production conditions were kept constant and it appears that addition of calcium did not have a significant effect on the over-run properties. The control, AquaMin fortified ice-ream and the calcium carbonate fortified ice-cream had the following over-run of 130%, 139% and 136% respectively.

EXAMPLE 7

CALCIUM FORTIFICATION OF LOW FAT ICE-CREAM

Low fat ice-cream was made using a standard recipe.

Three batches of ice-cream were made:

1. + 0.8% AquaMin
2. + 0.6% Calcium carbonate
3. Control

(Addition of AquaMin provides 100% Calcium fortification in a 200g serving)

Processing conditions were kept constant and it was determined that there were no differences in the over-run between the different batches.

A sensory analysis of the ice-cream was carried out under controlled conditions (report available upon request) during which panelists were asked to assess samples from the three batches ice-cream using the following parameters :

Sample:

Sweetness (1 = not sweet, 5 = extremely sweet)

Creaminess (organoleptic property) (1 = not creamy, 5 = extremely creamy)

Iciness/Coarseness (1 = very icy, 5 = not icy)

Overall acceptability (1 = worst, 5 = best)

17 panelists took part in this analysis and the results were as follows:

	Sample A +0.8% AquaMin	Sample B +0.6% CaCO ₃	Sample C Control
Sweetness	3.29	3.12	3.18
Creaminess	4	3.35	3.53

most preferably 1 to 2% by weight more particularly it is up to about 1.6% by weight of the product. For example in biscuits intended to supplement a diet with calcium one can employ approximately 20 grams per so-called biscuit representing about 2% of the final product.

The addition of the calcareous product used in the invention as compared to the results when other sources of calcium are used not only improved the properties of baked produces but, in some instances, has also been found to provide a buffering effect in the stomach and also appears to provide anticariogenic effects. It is believed that this may partly arise from protection against acid in the mouth.

The invention will now be illustrated by the following examples which are not however intended to limit the scope of the invention. The Calcium Product (calcareous product derived from corallinaceae) employed is a commercial product prepared from Lithothamnium coralliodes residues as described above and having the analysis set out above and identified commercially as AquaMin (trademark). The coated Calcium Product is the calcareous product coated with a mono-diglyceride.

EXAMPLE 1

Fortification of pasta with calcium

A conventional pasta product of the spaghetti nature manufactured from durum or other hard wheat flour was employed.

Manufacture of Pasta:

A basic recipe for pasta was used.

Durham Wheat Semolina (766g) + Tap Water (234g) → 1Kg of Pasta.

Mix for 10 min in mixing chamber of the pasta press

↓

Rest for 5 min

↓

Warm up die : Extrude

↓

Cook for four min

↓

Cool for 30-60 sec under running tap water

↓

the appearance and taste of the biscuits fortified with Calcareous Product and coated Calcareous Product when compared with the control. Most people were unable to identify which biscuits had the additional Calcium. However the biscuits fortified with Calcium Carbonate were pale in colour, soft and unpalatable o taste (loss of sweet flavour).

EXAMPLE 3

CALCIUM FORTIFICATION OF SPREADS

Margarine

Vegetable Oil Spread

Fat Content

80% minimum

70-20%

Nature of Fats

Saturated

Unsaturated



High Melting Point Low Melting Point

Emulsion

There are two phases:

Water Phase

Oil Phase

The two phases are mixed to build the emulsion. Emulsion building requires energy input in the form of mechanical agitation, ultrasonic vibration or heat.

1. Emulsion Building (3 to 5 minutes)
2. Quick Chilling To 15°C
3. Fat Crystallization

Method

AquaMin (calcareous product) must be added to the oil phase : the oil will go inside the pores. This will help stabilize the emulsion.

The order of mixing is critical for the addition of AquaMin to this type of emulsion structure spread.

If AquaMin is added to the water phase first, then the water enters the porous structure and these pores become polar. The outside surface of AquaMin is also polar, so that when this is now mixed with the oil, which is hydrophobic, this will destabilize the emulsion.

If however, AquaMin is added to the oil phase first, then the oil enters the

Sample:

Taste (1 = very poor, 5 = very good)

Grittiness (1 = very gritty, 5 = not gritty)

Overall acceptability (1 = worst, 5 = best)

19 panelists took part in this analysis and the results were as follows

Sample	Taste	Grittiness	Acceptability	Preference
A. AquaMin	3.2	4.6	3.6	15
B. Calcium Carbonate	2.8	4.3	2.9	1
C. Control	2.7	2.9	2.3	3

From the results it is clear that AquaMin fortified ice-cream is predominant 79% of panelists preferred the ice-cream fortified with AquaMin. The control and the ice-cream fortified with calcium carbonate lagged behind, with only 16% and 5% of preferences respectively. The ice-cream fortified with AquaM scored highest on all parameters of taste, grittiness and acceptability (organoleptic properties).

3. Colour was measured using a Minolta colour meter and the results were expressed using LAB values:

L = Lightness

A = Red Colour

B = Yellow Colour

Sample	L value	A value	B value
Control	94.03	-3.21	11.82
AquaMin fortified ice-cream	94.39	-2.87	11.37
Calcium carbonate fortified ice-cream	95.61	-2.84	10.83

A statistical Student's t- Test was carried out on these values (9 values for each sample) and the results of the test showed that there was a significant difference between the control and the ice-cream fortified with calcium carbonate for each of the three parameters. AquaMin only had a significant effect on the A value of the ice-cream,

it did not effect the L or B values.

4. A further batch of ice-ream was made to assess if calcium addition effected the over-run properties of the ice-cream. Production conditions were kept constant and it appears that addition of calcium did not have a significant effect on the over-run properties. The control, AquaMin fortified ice-ream and the calcium carbonate fortified ice-cream had the following over-run of 130%, 139% and 136% respectively.

EXAMPLE 7

CALCIUM FORTIFICATION OF LOW FAT ICE-CREAM

Low fat ice-cream was made using a standard recipe.

Three batches of ice-cream were made:

1. + 0.8% AquaMin
2. + 0.6% Calcium carbonate
3. Control

(Addition of AquaMin provides 100% Calcium fortification in a 200g serving)

Processing conditions were kept constant and it was determined that there were no differences in the over-run between the different batches.

A sensory analysis of the ice-cream was carried out under controlled conditions (report available upon request) during which panelists were asked to assess samples from the three batches ice-cream using the following parameters :

Sample:

Sweetness (1 = not sweet, 5 = extremely sweet)

Creaminess (organoleptic property) (1 = not creamy, 5 = extremely creamy)

Iciness/Coarseness (1 = very icy, 5 = not icy)

Overall acceptability (1 = worst, 5 = best)

17 panelists took part in this analysis and the results were as follows:

	Sample A +0.8% AquaMin	Sample B +0.6% CaCO ₃	Sample C Control
Sweetness	3.29	3.12	3.18
Creaminess	4	3.35	3.53